

REMARKS

Applicants have filed herewith a Request for Continued Examination, and hereby authorize the deduction of any required fees, including extensions of time, from deposit account 01-0659.

Claims 1 and 7 have been amended to include the limitation that catalyst I has a specific surface area of 100-180 m²/g. Support for this amendment can be found in paragraph [0027] of the present specification. No new matter has been added through this amendment.

REMARKS IN RESPONSE TO ADVISORY ACTION

Applicants note that the Examiner contends that the amendment to Claims 1 and 7 to include the limitation that catalyst I has a specific surface area of 100-180 m²/g would necessitate a new search, and the amendment was thus not entered. Applicants respectfully disagree with the Examiner as to this point and note that the original claims as filed included the limitation that catalyst I and catalyst II have a specific surface area of "greater than 100m²/g". Applicants submit that the range 100-180 m²/g is within the range of "greater than 100m²/g", thus the Examiner has incorrectly represented that an additional search would be necessary to account for the range of 100-180 m²/g.

CLAIM REJECTIONS

Claims 1-4 and 6-10 have been rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent Number 6,086,749, Kramer, et al. ("Kramer") in view of United States Patent Number 4,414,141, Schindler ("Schindler"). The Examiner continues to describe the reasons for rejection of the individual claims, and applicants will address these rejections in the order listed in the office action for completeness.

FIRST REJECTION UNDER 35 U.S.C. 103

Claims 1 and 3 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Kramer in view of Schindler.

EXAMINER'S POSITION

The Examiner takes the position that Kramer discloses a process for the hydroconversion of a hydrocarbon feed in the presence of a catalyst mixture of two catalysts that each contain Group VIB and VIII metals on a porous organic support where at least 75% of the total pore volume are in pores between about 20 to about 30nm and less than 10% of the total pore volume is in pores within the range of 0 to 10nm. The Examiner continues that the catalysts of Kramer have a surface area ranging from at least about 200 to about 600m²/g and a pore volume ranging from about 0.8 to about 3.0cc/g. The Examiner also states that Kramer discloses that the difference between the densities in the first and second catalyst can be +/-10wt.%.

The Examiner notes, however, that Kramer does not disclose that the second catalyst has at least 5% of the pore volume in pores with a diameter of at least 100nm. However, the Examiner contends that Schindler discloses a catalyst that has 0.25cc/g out of 1.20cc/g in pores with a diameter of at least 100nm, and continues that Schindler discloses that this catalyst also has increased catalyst life.

Therefore, the Examiner takes the position that it would have been obvious to one having ordinary skill in the art to modify the process of Kramer to include a catalyst that has 0.25cc/g out of 1.20 cc/g in pores with a diameter

APPLICANTS' POSITION

Applicants respectfully disagree with the Examiner, and applicants take the position that the present invention is not obvious in light of the teachings of Kramer or the teachings of Kramer in combination with Schindler.

The present invention, as amended, relates to a process for hydroprocessing a heavy hydrocarbon oil and the catalyst mixture used therein. The process involves contacting a heavy hydrocarbon oil in the presence of hydrogen with a mixture of hydroprocessing catalyst I and hydroprocessing catalyst II, and the catalyst mixture herein claimed is the mixture of hydroprocessing catalyst I and hydroprocessing catalyst II. Catalyst I comprises a Group VIB metal and optionally a Group VIII metal on a porous inorganic carrier. Catalyst I is further described as having a specific surface area of 100-180 m²/g, a total pore volume of at least 0.55 ml/g, and a pore size distribution for inhibiting sediment formation and promoting asphaltene removal such that at least 50% of the total pore volume in pores with a diameter of at least 20 nm (200 Å) and at least 65% of the total pore volume in pores with a diameter of 10-120 nm (100-1200 Å), wherein less than 25% of the total pore volume of catalyst I is in pores having a diameter of 10 nm (100 Å) or less. Catalyst II comprises a Group VIB metal and optionally a Group VIII metal on a porous inorganic carrier. Catalyst II is further described as a specific surface area of at least 100 m²/g, and a pore size distribution for providing catalytic activity and inhibiting sediment formation such that a total pore volume of at least 0.55 ml/g, 30-80% of the pore volume in pores with a diameter of 10-20 nm (100-200 Å), and at least 5% of the pore volume in pores with a diameter of at least 100 nm (1000 Å), wherein less than 25% of the total pore volume of catalyst II is in pores having a diameter of 10 nm (100 Å) or less. The present claims further include the limitation that catalyst I has a larger percentage of its pore volume in pores with a diameter of at least 20 nm (200 Å) than catalyst II.

Applicants first take the opportunity that the teachings of Kramer require that the BET of both catalysts be at least 200m²/g, see col. 33, lines 6-11. Thus applicants take the position that

the currently amended claims, based on BET alone or unobvious in light of Kramer. Applicants further take the position that the combination of Kramer and Schindler would not obviate the present claims based on the BET limitation of catalyst I alone. Applicants note that Schindler does disclose at col. 1, lines 56-60, that the catalysts used therein can have a BET of "...at least $125\text{m}^2/\text{g}$, and most generally from $150\text{-}300\text{m}^2/\text{g}$ ". However, one having ordinary skill in the art would not find it obvious to use a catalyst that has a BET of less than be at least $200\text{m}^2/\text{g}$, Schindler, in a process that teaches that the BET of a first catalyst suitable for use therein be at least $200\text{m}^2/\text{g}$, Kramer. Thus, applicants take the position that the combination of Schindler and Kramer is improper, and applicants further take the position that even if deemed proper, which applicants do not concede, would not be proper to provide for a first catalyst as is claimed through the present amendment. Instead, one would only be taught to use a catalyst having a BET of greater than $200\text{m}^2/\text{g}$.

Thus, applicants respectfully take the position that the presently amended claims are unobvious in light of Kramer and Schindler based on the BET of catalyst I alone.

However, applicants respectfully point out that the present claims further include the limitation that catalyst I has a larger percentage of its pore volume in pores with a diameter of at least 20 nm (200 Å) than catalyst II. Applicants respectfully submit that neither Kramer, Schindler, nor the combination of Kramer and Schindler includes a teaching, motivation, or suggestion that the first catalyst has a larger percentage of its pore volume in pores with a diameter of at least 20 nm (200 Å) than the second catalyst. In fact, Kramer is completely silent as to maintaining the pore volume of either catalyst in relation to the other catalyst. Note, since Schindler only teaches a single catalyst, it is also completely silent as to the limitation that the first catalyst has a larger percentage of its pore volume in pores with a diameter of at least 20 nm (200 Å) than the second catalyst.

With regards to claim 3, claim 3 is a dependent claim and by definition includes all of the limitations of the claims from which it depends. Therefore, claim 3 includes all of the limitations of novel, independent Claim 1, and is therefore novel and unobvious in light of Kramer for, among other reasons, the reasons discussed above.

The Examiner is requested to reconsider and withdraw this rejection.

SECOND REJECTION UNDER 35 U.S.C. 103

Claim 2 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Kramer.

EXAMINER'S POSITION

The Examiner takes the position that Claim 2 is obvious in light of Kramer for the reasons noted on page 4 of the office action.

APPLICANTS' POSITION

Applicants respectfully disagree with the Examiner, and applicants take the position that Claim 2 is not obvious in light of the teachings of Kramer. Claim 2 is a dependent claim and by definition include all of the limitations of the claims from which they depend. Therefore, claim 2 includes all of the limitations of novel, independent Claim 1, and is therefore novel and unobvious in light of Kramer for, among other reasons, the reasons discussed above.

The Examiner is requested to reconsider and withdraw this rejection.

THIRD REJECTION UNDER 35 U.S.C. 103

Claim 4 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Kramer.

EXAMINER'S POSITION

The Examiner takes the position that Claim 2 is obvious in light of Kramer for the reasons noted on page 4 of the office action.

APPLICANTS' POSITION

Applicants respectfully disagree with the Examiner, and applicants take the position that Claim 4 is not obvious in light of the teachings of Kramer. Claim 4 is a dependent claim and by definition include all of the limitations of the claims from which they depend. Therefore, claim 4 includes all of the limitations of novel, independent Claim 1, and is therefore novel and unobvious in light of Kramer for, among other reasons, the reasons discussed above.

The Examiner is requested to reconsider and withdraw this rejection.

FOURTH REJECTION UNDER 35 U.S.C. 103

Claim 6 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Kramer.

EXAMINER'S POSITION

The Examiner takes the position that Claim 6 is obvious in light of the teachings of Kramer for the reasons noted on page 4 of the office action.

APPLICANTS' POSITION

Applicants respectfully disagree with the Examiner, and applicants take the position that Claim 6 is not obvious in light of the teachings of Kramer. Claim 6 is a dependent claim and by definition includes all of the limitations of the claims from which it depends. Therefore, claim 6 includes all of the limitations of novel, independent Claim 1, and is therefore novel and unobvious in light of Kramer for, among other reasons, the reasons discussed above.

The Examiner is requested to reconsider and withdraw this rejection.

FIFTH REJECTION UNDER 35 U.S.C. 103

Claims 7 and 9 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Kramer in view of Schindler.

EXAMINER'S POSITION

The Examiner takes the position that Claim 7 is obvious in light of the teachings of Clark in combination with Schindler for the reasons noted on pages 5-7 of the office action. In short, the Examiner has rejected Claim 7 for the same reasons discussed above in relation to the First Rejection under 103(a). The Examiner continues that claim 9 is also rejected in light of these disclosures.

APPLICANTS' POSITION

Applicants respectfully disagree with the Examiner, and applicants take the position that claims 7 and 9, as amended, are not obvious in light of the teachings of Kramer or the teachings of Kramer in combination with Schindler.

Claim 7, as amended, relates to a mixture of hydroprocessing catalyst I and hydroprocessing catalyst II. Catalyst I comprises a Group VIB metal and optionally a Group VIII metal on a porous inorganic carrier. Catalyst I is further described as having a specific surface area of 100-180 m²/g, a total pore volume of at least 0.55 ml/g, and a pore size distribution for inhibiting sediment formation and promoting asphaltene removal such that at least 50% of the total pore volume in pores with a diameter of at least 20 nm (200 Å) and at least 65% of the total pore volume in pores with a diameter of 10-120 nm (100-1200 Å), wherein less than 25% of the total pore volume of catalyst I is in pores having a diameter of 10 nm (100 Å) or less. Catalyst II comprises a Group VIB metal and optionally a Group VIII metal on a porous inorganic carrier. Catalyst II is further described as a specific surface area of at least 100 m²/g, and a pore size distribution for providing catalytic activity and inhibiting sediment formation such that a total pore volume of at least 0.55 ml/g, 30-80% of the pore volume in pores with a diameter of 10-20 nm (100-200 Å), and at least 5% of the pore volume in pores with a diameter of at least 100 nm (1000 Å), wherein less than 25% of the total pore volume of catalyst II is in pores having a diameter of 10 nm (100 Å) or less. The present claims further include the limitation that catalyst I has a larger percentage of its pore volume in pores with a diameter of at least 20 nm (200 Å) than catalyst II.

Applicants first take the opportunity that the teachings of Kramer require that the BET of both catalysts be at least 200m²/g, see col. 33, lines 6-11. Thus applicants take the position that the currently amended claims, based on BET alone or unobvious in light of Kramer. Applicants further take the position that the combination of Kramer and Schindler would not obviate the present claims based on the BET limitation of catalyst I alone. Applicants note that Schindler does disclose at col. 1, lines 56-60, that the catalysts used therein can have a BET of "...at least 125m²/g, and most generally from 150-300m²/g". However, one having ordinary skill in the art

would not find it obvious to use a catalyst that has a BET of less than be at least $200\text{m}^2/\text{g}$, Schindler, in a process that teaches that the BET of a first catalyst suitable for use therein be at least $200\text{m}^2/\text{g}$, Kramer. Thus, applicants take the position that the combination of Schindler and Kramer is improper, and applicants further take the position that even if deemed proper, which applicants do not concede, would not be proper to provide for a first catalyst as is claimed through the present amendment. Instead, one would only be taught to use a catalyst having a BET of greater than $200\text{m}^2/\text{g}$.

Thus, applicants respectfully take the position that the presently amended claims are unobvious in light of Kramer and Schindler based on the BET of catalyst I alone.

However, applicants respectfully point out that the present claims further include the limitation that catalyst I has a larger percentage of its pore volume in pores with a diameter of at least 20 nm (200 Å) than catalyst II. Applicants respectfully submit that neither Kramer, Schindler, nor the combination of Kramer and Schindler includes a teaching, motivation, or suggestion that the first catalyst has a larger percentage of its pore volume in pores with a diameter of at least 20 nm (200 Å) than the second catalyst. In fact, Kramer is completely silent as to maintaining the pore volume of either catalyst in relation to the other catalyst. Note, since Schindler only teaches a single catalyst, it is also completely silent as to the limitation that the first catalyst has a larger percentage of its pore volume in pores with a diameter of at least 20 nm (200 Å) than the second catalyst.

With regards to claim 3, claim 3 is a dependent claim and by definition includes all of the limitations of the claims from which it depends. Therefore, claim 3 includes all of the limitations of novel, independent Claim 1, and is therefore novel and unobvious in light of Kramer for, among other reasons, the reasons discussed above.

The Examiner is requested to reconsider and withdraw this rejection.

With regards to claim 9, claim 9 is a dependent claim and by definition includes all of the limitations of the claims from which it depends. Therefore, claim 9 includes all of the limitations of novel, independent Claim 7, and is therefore novel and unobvious in light of Kramer for, among other reasons, the reasons discussed above.

The Examiner is requested to reconsider and withdraw this rejection.

SIXTH REJECTION UNDER 35 U.S.C. 103

Claim 8 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Kramer.

EXAMINER'S POSITION

The Examiner takes the position that Claim 8 is obvious in light of the teachings of Kramer for the reasons noted on page 5 of the office action.

APPLICANTS' POSITION

Applicants respectfully disagree with the Examiner, and applicants take the position that Claim 8 is not obvious in light of the teachings of Kramer. Claim 8 is a dependent claim and by definition includes all of the limitations of the claims from which it depends. Therefore, claim 8 includes all of the limitations of novel, independent Claim 7, and is therefore novel and unobvious in light of Kramer for, among other reasons, the reasons discussed above.

The Examiner is requested to reconsider and withdraw this rejection.

SEVENTH REJECTION UNDER 35 U.S.C. 103

Claim 10 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Kramer.

EXAMINER'S POSITION

The Examiner takes the position that Claim 10 is obvious in light of the teachings of Kramer for the reasons noted on page 6 of the office action.

APPLICANTS' POSITION

Applicants respectfully disagree with the Examiner, and applicants take the position that Claim 10 is not obvious in light of the teachings of Kramer. Claim 10 is a dependent claim and by definition includes all of the limitations of the claims from which it depends. Therefore, claim 10 includes all of the limitations of novel, independent Claim 7, and is therefore novel and unobvious in light of Kramer for, among other reasons, the reasons discussed above.

The Examiner is requested to reconsider and withdraw this rejection.

EIGHT REJECTION UNDER 35 U.S.C. 103

Claim 5 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Kramer in view of Schindler as applied to claim 1, and further in view of United States Patent Number 4,069,139, Riley, et al. ("Riley").

EXAMINER'S POSITION

The Examiner has cited Riley to provide disclosure of a heavy hydrocarbon feed having the properties noted on page 6 of the office action.

APPLICANTS' POSITION

Applicants respectfully disagree with the Examiner, and applicants take the position that Claim 5 is not obvious in light of the teachings of Kramer, in light of Schindler, in further view of Riley. Claim 5 is a dependent claim and by definition includes all of the limitations of the claims from which it depends. Therefore, claim 5 includes all of the limitations of novel, independent Claim 1, and is therefore novel and unobvious in light of Kramer for, among other reasons, the reasons discussed above.

The Examiner is requested to reconsider and withdraw this rejection.

EXAMINER'S RESPONSE TO ARGUMENTS

In response to the arguments applicant has presented in their previous response, the Examiner points to Kramer alone as support for the pore size distribution discussed in the applicants response.

APPLICANTS' POSITION

Applicants note the Examiner's comments are only in relation to the pore size distribution argued by applicants in their response. However, applicants respectfully ask the Examiner to consider all of the limitations contained in the present claims including the limitation that the first catalyst has a larger percentage of its pore volume in pores with a diameter of at least 20 nm (200 Å) than the second catalyst, the BET of the catalyst I, as amended, etc. As noted above, applicants respectfully submit that neither Kramer, Schindler, nor the combination of Kramer and Schindler includes a teaching, motivation, or suggestion that the first catalyst has a larger percentage of its pore volume in pores with a diameter of at least 20 nm (200 Å) than the second catalyst. In fact, Kramer is completely silent as to maintaining the pore volume of either catalyst in relation to the other catalyst, and since Schindler only teaches a single catalyst, it is also completely silent as to the limitation that the first catalyst has a larger percentage of its pore volume in pores with a diameter of at least 20 nm (200 Å) than the second catalyst.

Based on the preceding amendments and remarks, the Examiner is requested to withdraw all objections, reconsider and withdraw all rejections, and pass this application to allowance. The Examiner is encouraged to contact applicants' attorney should the Examiner wish to discuss this application further.

Respectfully submitted,

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